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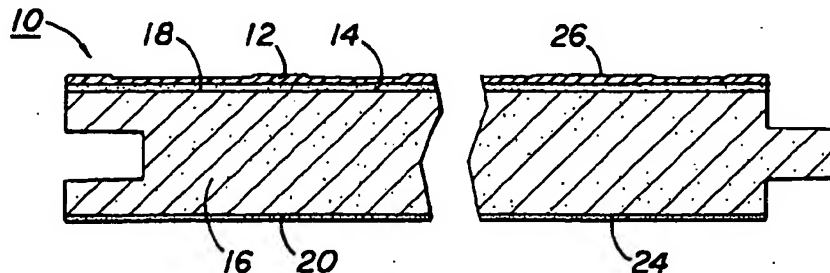
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(54) Title: TEXTURED LAMINATE FLOORING



(57) Abstract: A decorated floor panel (10) having a core (16) with a top surface (18) and an opposite bottom surface (20); a decorative layer (14) coupled to the top surface (18) of the core (16), the decorative layer (14) having a desired aesthetic appearance; and a wear layer (12) coupled to and substantially covering the decorative layer (14) for protecting the decorative layer (14). The wear layer (12) has an exposed wear surface (26) with depressions therein of a variable depth below the wear surface, the depressions being arranged to display a desired texture pattern.



WO 02/058924 A1

## Textured Laminate Flooring

### BACKGROUND OF THE INVENTION

#### 5 Field of the Invention

The present invention relates generally to flooring panels for use in commercial, industrial or residential environments. More particularly, this invention relates to flooring panels having an aesthetically pleasing appearance provided by texturing imparted to the surface of the panels. In certain embodiments, the texture is aligned in registration with a  
10 visible graphic design displayed by the panel to further enhance the aesthetic appearance of the flooring panel.

#### Background Art

Various laminates, including high pressure laminates and fiberboard core laminates,  
15 are commonly used in flooring applications. Fiberboard core laminates used to manufacture flooring products include a plurality of layers, including a fiberboard or organic composite core section, a decorative layer, and a hard and flat protective wear layer of resin-impregnated melamine material.

20 The wear layer of the laminate in such systems is typically clear, such that the aesthetic appearance, including any color and/or printed image of the decorative layer, is not obscured by the wear layer. Further, the top surface of the wear layer is typically flat, such that the flooring panel exhibits a two-dimensional appearance to the onlooker. Thus, while the decorative layer may exhibit an appearance that simulates "natural" flooring  
25 materials such as hardwood or ceramic tile, the typical laminate wear layer simply allows an unobstructed view of the laminate decorative layer, and does not add to or enhance the

aesthetic properties of the flooring panel.

Some prior art laminate flooring systems have included barely-perceptible indentations imparted to the laminate wear layer to interrupt the aforementioned two-dimensional appearance. Those systems feature shallow indentations of a depth not exceeding 0.25 millimeters ("mm"). Further, the location of individual indentations or the "pattern" of indentations provided in prior art systems are unrelated and unlinked to the aesthetic image provided by the decorative laminate layer. Thus, any indentation pattern in prior art laminate wear layers is not related in any way to the selected aesthetic appearance of the decorative laminate layer.

#### SUMMARY OF THE INVENTION

The present invention, in one embodiment, is a decorated floor panel including a core having a top surface and an opposite bottom surface. A decorative layer is adhered to the top surface of the core and, in one embodiment, substantially covers the core. A desired aesthetic appearance, such as a hardwood or ceramic tile appearance, is displayed by the decorative layer of the laminate. Finally, a wear layer is provided over the decorative layer, substantially covering the decorative layer and providing protection from the ambient environment. The wear layer has an exposed wear surface with depressions therein of a variable depth below the wear surface, the depressions being arranged to display a desired texture pattern.

In another aspect, the present invention is a decorated floor panel as set forth above, wherein the depressions in the wear surface have a depth of at least 0.50 mm below the nominal surface of the wear layer. In this embodiment, the depressions may all be of a constant depth or, alternatively, of a variable depth as exists for the embodiment discussed

above.

In yet another aspect, the present invention is a decorated floor panel in which the decorative layer is provided with a decorative pattern. In one embodiment, a plurality of  
5 depressions imparted to the wear layer form a desired texture pattern thereon. The relative orientation of the texture pattern and the decorative pattern is controlled such that the depression pattern and the texture pattern are substantially in registration, creating an enhanced, three-dimensional aesthetic appearance to the decorated floor panel.

10 In yet another aspect, the present invention is a floor system comprised of a plurality of individual decorated floor panels assembled together and interlocking with each other by tongue and groove engagement, which is not visible after the floor panels are assembled.

15 **BRIEF DESCRIPTION OF THE FIGURES OF THE DRAWINGS**

Fig. 1 is a perspective view of an embodiment of the decorated floor panel according to the present invention.

Fig. 1A is an enlarged fragmentary view of an embodiment of the decorated floor  
20 panel of Fig. 1, the texture pattern being represented out of registration with the decorative pattern.

Fig. 1B is an enlarged fragmentary view of an embodiment of the decorated floor  
panel of Fig. 1, the texture pattern being represented in registration with the decorative  
25 pattern.

Fig. 2 is a section taken along lines 2-2 in Fig. 1.

Fig. 3 is a perspective cut-away view of an embodiment of the decorated floor panel according to the present invention.

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Fig. 4 is a perspective view of a group of decorated floor panels according to the present invention assembled to form a portion of a floor system.

Fig. 5 is a section taken along lines 5-5 in Fig. 4.

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#### DETAILED DESCRIPTION OF THE INVENTION

The present invention is more particularly described in the following examples that are intended as illustrative only since numerous modifications and variations therein will be apparent to those skilled in the art. As used in the specification and in the claims, "a,"  
15 "an," or "the" can mean one or more, depending upon the context in which it is used. The preferred embodiment is now described with reference to the figures, in which like numbers indicate like parts throughout the figures.

Referring to Fig. 1, the present invention, in one embodiment, is a decorated floor  
20 panel 10. In the illustrated embodiment, the panel 10 is manufactured from a laminated material having a fiberboard core. Alternatively, the floor panel 10 of the invention may be manufactured from other materials, including other laminates such as high pressure laminate ("HPL"), which have been marketed under such trade names as Formica and Pergo. Other materials may also be utilized to construct the floor panel, such as other  
25 natural, recycled or synthetic materials.

The fiberboard core laminate illustrated in Fig. 3 includes a plurality of discrete layers, including a wear layer 12, a decorative layer 14, a core 16 and a backing layer 24. The illustrated core 16 is preferably manufactured of fiberboard, such as that marketed by companies including Louisiana Pacific, Georgia Pacific, Temple Inland and Weyerhaeuser.

5 The presently preferred fiberboard core material is formed of high density fiberboard, which is a hardwood/softwood fiber compound compressed at 900 - 960 kg/m<sup>3</sup>. The preferred fiberboard core material is usually available in 4 or 5 feet widths and lengths of up to 18 feet. In other embodiments, cores 16 of different materials or having different properties may be utilized, including other timber-based products, such as plywood,

10 chipboard or particleboard.

Referring now to Figs. 2 and 3, the core 16 has a top surface 18 and an opposite bottom surface 20. When installed, the bottom surface 20 of the core 16 faces the underlying subfloor (not shown). Fig. 3 illustrates an embodiment having an optional

15 backing layer 24 adhered to the bottom surface 20 of the core 16. Because the illustrated fiberboard core is not completely impervious to moisture and contaminants, such a backing layer 24 may be provided to improve moisture resistance of the floor panel 10. Additionally, the backing layer 24 may improve structural integrity of the floor panel 10 by increasing overall thickness and reducing the warp and wear tendencies of uncoated core

20 material. In one embodiment, a clear backing layer 24 of melamine, reinforced with aluminum oxide (AlO<sub>2</sub>) and impregnated with a thermosetting resin, is utilized. In such an embodiment, an optional layer (not shown) may be interposed between the bottom surface 20 of the core 16 and the backing layer 24. In one embodiment, the optional layer is constructed of paper. The optional layer may display a printed image, such as a trademark,

25 product number or name, or any other desired marking or designation. In other embodiments, backing layers 24 may be constructed of other materials providing suitable

moisture resistance, such as phenolic resins or other natural, synthetic or recycled materials.

A decorative layer or "decor" layer 14 is adhered, joined, or coupled to the top  
5 surface 18 of the core 16 by a chemical adhesive, mechanical connection, or other means  
known in the art. In the illustrated embodiment, the decorative layer 14 is a sheet of paper  
that substantially covers the top surface 18 of the core 16. Thus, in the illustrated  
embodiment, the top and bottom surfaces 18, 20 of the core 16 are covered by the  
decorative layer 14 and the backing layer 24, respectively. The visible side of the  
10 decorative layer 14, i.e., the side not adhered to the core 16, is capable of displaying a  
desired aesthetic appearance, such as a color or pattern. Virtually any color or pattern may  
be imparted to the decorative layer 14. For example, currently contemplated patterns  
include simulated hardwood flooring and simulated ceramic tile, each in a variety of styles,  
shades and colors. Currently contemplated simulated hardwood styles include pine, heart  
15 pine, cherry, maple, beech, oak and mahogany. Simulated tile appearances are  
contemplated in a range of styles, including a variety of marble and ceramic tile colors,  
including groutlines in ceramic tile styles. Other currently contemplated patterns include  
floral patterns, abstract designs, geometric designs and company logos. Other patterns may  
be selected by the manufacturer or user according to aesthetic preference or design  
20 objectives.

As mentioned above, in one embodiment the decorative layer 14 is manufactured  
from paper that may be impregnated with a thermosetting resin and provided with the  
desired aesthetic color and/or pattern. In other embodiments that are not shown, other  
25 materials may make up the decorative layer 14, such as real wood veneer, pulverized stone,  
or other materials. Additionally, it is possible to achieve a similar decorative appearance

by either a direct or indirect printing process directly onto the top surface 18 of the core 16. In such an embodiment, the decorative layer 14 comprises whatever ink, dye, pigment or other marking substance applied to the core 16. Alternatively, the decorative appearance may be provided by etching, burning or otherwise marring the top surface 18 of the core 16. Any such treatment that supplies such a decorative appearance on the top surface 18 of the core 16 is contemplated to comprise the decorative layer 14 as defined herein.

Referring now to Fig. 3, a wear layer 12 is provided over the decorative layer 14, substantially covering the decorative layer 14 and providing protection from the ambient environment. The wear layer 12 is adhered, joined, or coupled to the decorative layer 14, just as the decorative layer 14 is joined to the underlying core 16. In one embodiment, the wear layer 12 is comprised of a melamine sheet, reinforced with aluminum oxide ( $\text{AlO}_2$ ) and impregnated with a thermosetting resin. It is preferred, though not required, that the material selected to comprise the wear layer 12 be the same or similar material as that selected to comprise the backing layer 24, if a backing layer 24 is utilized. Using "matched" materials for those layers has been found to minimize "warping" and "bowing" of the laminate material.

Alternatively, a layer of varnish or a UV curable scratch resistant coating may be used in place of the melamine sheet to comprise the wear layer 12. As further alternatives, other materials providing suitable moisture resistance and resilience to loads and wear to which a floor is subjected may be utilized, such as phenolic resins or other natural, synthetic or recycled materials.

After manufacture of the laminate material, the wear layer 12 is substantially transparent, so that the aesthetic appearance of the decorative layer 14 is substantially

unobstructed by the wear layer 12. It has been determined that the inclusion of a wear layer 12 as the outermost layer of the laminate generally improves the resistance of the floor panel 10 to wear, including staining or fading of the aesthetic image imparted to the decorative layer 14.

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As illustrated in Figs. 2 and 5, the outermost wear surface 26, i.e., the top surface of the wear layer 12 that is exposed to the ambient environment, is provided with a textured surface condition. Thus, in addition to the decorative aesthetic image displayed by the decorative layer 14, further aesthetic effect may be achieved by imparting depressions of a constant or variable depth to the wear surface 26, arranged to display a desired texture pattern. For example, in the embodiment illustrated in Fig. 1 in which the decorative pattern is a wood grain, a texture pattern featuring depressions designed to simulate wood grain may be provided. As a further example, in an embodiment in which the decorative pattern is a simulated ceramic tile having tile portions surrounded by groutlines, a texture pattern having an irregular simulated stone texture and roughened or non-smoothed depressions to simulate recessed grout may be provided. These examples are merely illustrative and are not intended to be exhaustive. Other decorative patterns and texture patterns may be selected by the manufacturer or user according to aesthetic preference or design objectives. When referencing depressions, one skilled in the art will appreciate that this term excludes the edges circumscribing the panel and instead encompasses "depressions" within the periphery of the edges.

In the embodiment shown in Fig. 1A, the texture pattern is imparted to the floor panel 10 without regard to the positioning of the decorative pattern. Thus, in this embodiment, the wood grain pattern displayed in the decorative layer 14 (depicted in dashed lines in Fig. 1A) does not necessarily "match," register with, or correspond to the

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wood grain pattern imparted as three-dimensional texture in the wear layer 12 (depicted in solid lines in Fig. 1A).

In another embodiment, shown in Fig. 1B, the texture pattern and the decorative  
5 pattern may be controlled during the manufacturing process such that the patterns "match." In the hardwood floor panel example, therefore, the textured grain pattern may be imparted to wear layer 12 (solid lines) in registration with the visible grain pattern in the decorative layer 14 (dashed lines). In such an embodiment, lines of depression in the wear layer 12 are located adjacent or substantially on top of the printed grain lines in the decorative layer  
10 14 of the laminate, providing an enhanced and more realistic aesthetic appearance.

As a further example, "knothole" patterns 30 in the decorative layer 14 are substantially overlaid by correspondingly shaped depressions in the wear layer 12 in Fig. 1B. Thus, in this embodiment, the hard wood flooring design displayed by the decorative  
15 layer 14 includes the visual appearance of at least one knothole 30. The wear surface 26 has at least one depression therein in registration with the knothole 30. The knothole 30 may be of a variety of shapes. In one embodiment, the knothole 30 is substantially circular, and the corresponding depression in registration with the knothole 30 is also substantially circular in top plan view. Other embodiments are contemplated in which the knothole 30  
20 has other shapes, such as an oval shape or some irregular shape similar to those found in natural hardwood planks. Such alternate embodiments are within the scope of the present invention.

In a currently contemplated hardwood embodiment, the depressions in the wear  
25 layer 12 in registration with the decorative pattern are imparted to a depth of at least 0.30 mm below the wear surface 26. In another contemplated embodiment, the depressions in

the wear layer 12 in registration with the decorative pattern are imparted to a depth of at least 0.50 mm below the wear surface 26. In still another contemplated embodiment, the depressions are imparted to a depth of at least 1.0 mm below the wear surface 26. In yet other contemplated embodiments, the depressions are imparted to a depth of at least 1.50 mm, 2.0 mm, 2.50 mm, or 3.0 mm, respectively, below the wear surface 26. The possible width of the depressions is unlimited, but in presently preferred embodiments, widths of between approximately 1.0 mm and 25.0 mm have been utilized.

Similarly, in the simulated ceramic tile embodiment shown in Figs. 4 and 5, the texture pattern may be imparted to the wear layer 12 in registration with the image imparted to the decorative layer 14. In one embodiment, the ceramic tile design of the decorative layer 14 includes the visual appearance of at least one groutline 40, and the wear layer 12 has at least one depression therein in registration with the groutline 40. In embodiments where the groutline 40 imparted to the decorative layer 14 is substantially square in shape, the corresponding depression in registration with the groutline 40 is also substantially square in top plan view. In another embodiments, the groutline 40 may be provided in any selected pattern, including but not limited to triangular, hexagonal, octagonal, or other patterns. Such alternate embodiments are within the scope of the present invention.

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In a currently contemplated simulated ceramic tile embodiment, the depressions in the wear layer 12 in registration with the groutline 40 are imparted to a depth below the wear surface 26 of at least 0.30 mm. In another contemplated embodiment, the depressions in the wear layer 24 in registration with the groutline 40 are imparted to a depth below the wear surface 26 of at least 0.50 mm. In still another contemplated embodiment, the depressions are imparted to a depth below the wear surface 26 of at least 1.0 mm. In yet

other contemplated embodiments, the depressions are imparted to a depth of at least 1.50 mm, 2.0 mm, 2.5 mm, or 3.0 mm, respectively, below the wear surface 26. The possible width of the depressions is unlimited, but in presently preferred embodiments, widths of between approximately 5.0 mm and 10.0 mm have been utilized.

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Also in simulated ceramic tile embodiments of the present invention, a "rough" simulated stone texture may be imparted to the areas of the wear layer 12 overlaying the simulated stone image 42 in the decorative layer 14. Further, any recessed depression in the wear layer 12 substantially overlaying the simulated groutline 40 in the decorative layer 14 may be provided with a "rough" simulated grout texture that is non-smooth visually and to the touch. This non-smooth and "rough" appearance more closely emulates the appearance of stone.

The selected texture pattern is usually, though not always, imparted to the wear layer 12 in a single manufacturing step, at the time the laminate layers are laminated together. In such an embodiment, the various laminate layers are positioned within a press (not shown) having a caul plate (also not shown) provided with an inverse impression of the selected texture pattern. After the laminate layers are positioned within the press, the caul plate is lowered to contact the wear layer 12 of the laminate. In a single step, under heat and pressure for a selected period of time, the layers are laminated together and the texture pattern is imparted to the wear layer 12 by the action of the caul plate. Through experimentation, it has been noted that satisfactory results may be obtained by the application of between 380 - 420 psi at between 350°F - 400°F for a period of 18 - 60 seconds. These parameters are set forth by way of example only for an approximately 6.0 mm thick melamine wear layer product sold by the Mead Corporation. It is expected that any of these parameters will vary depending on the degree and depth of depressions sought

to be imparted to the wear layer or depending on the characteristics of the selected wear layer material. One skilled in the art will appreciate that after experimentation, other parameters may produce similarly satisfactory results.

- 5           Alternatively, the texture pattern may be imparted to the wear layer 12 in a separate operation, after lamination of the various layers into a single workpiece.

          The depth to which the wear layer 12 is depressed to provide the full texture patterns may be controlled during the manufacturing process. It is contemplated that to  
10       provide the most beneficial texture pattern, depressions of a depth at least 0.25 mm should be imparted to the wear layer 12. More specifically, depressions of between 0.30 mm and 5.75 mm in depth, more preferably between 1.0 mm and 5.75 mm in depth, and most preferably between 1.5 mm and 5.75 mm in depth, measured from the nominal surface of  
15       the wear layer 12, have been found to provide the greatest aesthetic effect while not diminishing performance of the overall floor system. These ranges are applicable in  
embodiments in which a melamine wear layer of approximately 6.0 mm thickness, manufactured by the Mead Corporation, is utilized. It has been found that depressions of a depth up to 0.25 mm less than the nominal thickness of such a wear layer 12 may be  
20       achieved using the above-described manufacturing methods; that is, if the nominal thickness is 5.0 mm, then the deepest depressions preferably should be no greater than 4.75 mm. In another preferred embodiment, the deepest depressions should be of a depth up to 0.50 mm less than the nominal thickness of the wear layer 12.

          It is expected that if other thicknesses, materials or manufacturing methods are  
25       selected to comprise the wear layer 12, different preferred ranges may exist for each selected material.

Additional process controls or equipment may be required to manufacture flooring panels 10 according to embodiments of the invention in which substantial registration between the decorative pattern and the texture pattern are required. In a presently preferred embodiment, a short-cycle press manufactured by Wemhoner and operated by Stiles Machinery, 3965 44th St. S.E., Grand Rapids, MI 49512 has been found satisfactory for achieving such registration between the decorative pattern and the texture pattern.

During the manufacturing process, in one embodiment, the various separate layers are assembled in preparation for lamination. In the embodiment shown in Fig. 3, for example, a backing layer 24, a core 16, a decorative layer 14 and a wear layer 12 are stacked together before entering the press. Through processing equipment controls such as a single sheet alignment system and electrostatic bonding of the various laminate layers prior to entry into the press, alignment between the decorative pattern displayed by the decorative layer 14 and the texture pattern imparted to the wear layer 12 by the caul plate may be achieved within a tolerance of 0.125 inches.

As illustrated in Fig. 5, individual floor panels 10 according to the invention may be assembled to form a complete floor system. To facilitate assembly, individual floor panels may be provided with means for interlocking with adjacently placed panels. As shown in Fig. 1, each floor panel 10 may include a first pair of parallel sides 50, 52 having tongue and groove cuts along the first and second parallel sides 50, 52, respectively. Each such floor panel 10 further includes a second pair of parallel sides 54, 56, perpendicular to each of the first pair of parallel sides 50, 52, also having tongue and groove cuts. Thus, each such floor panel 10 is capable of interlocking engagement with an adjacent panel. Alternatively, locking edge connections, such as that described in U.S. Patent No. 6,006,486 to Moriau et al. (which is incorporated herein in its entirety by reference), may

be utilized to form a floor covering system in which neighboring floor panels 10 are detachably secured to one another through a mechanical interlock.

Along the edges of the floor system, perimeter panels may be cut to length as  
5 needed to fit the installation environment and fitted with matching trim pieces (not shown) to provide an aesthetically attractive fit adjacent walls, stairs, doorways or other obstructions or transition areas.

In a presently preferred embodiment, individual floor panels 10 are manufactured to  
10 a width of  $11 \frac{1}{2}$  inches and a length of  $46 \frac{1}{16}$  inches, with an approximate thickness of  $5/16$  inches. One skilled in the art will appreciate that other panel sizes may be used without departing from the scope of the invention.

Although the present invention has been described with reference to specific details  
15 of certain embodiments thereof, it is not intended that such details should be regarded as limitations upon the scope of the invention except as and to the extent that they are included in the accompanying claims.

**What is claimed is:**

1. A decorated floor panel comprising:
  - a. a core having a top surface and an opposite bottom surface;
  - b. a decorative layer coupled to the top surface of the core, the decorative layer having a desired aesthetic appearance; and
  - c. a wear layer coupled to and substantially covering the decorative layer for protecting the decorative layer,the wear layer having an exposed wear surface with depressions therein of a variable depth below the wear surface, the depressions being arranged to display a desired texture pattern.
2. A decorated floor panel comprising:
  - a. a core having a top surface and an opposite bottom surface;
  - b. a decorative layer coupled to the top surface of the core, the decorative layer having a desired aesthetic appearance; and
  - c. a wear layer coupled to and substantially covering the decorative layer for protecting the decorative layer,the wear layer having an exposed wear surface with depressions therein, at least one depression reaching a depth of at least 0.50 millimeters below the wear surface, the depressions being arranged to display a desired texture pattern.

3. A decorated floor panel comprising:
  - a. a core having a top surface and an opposite bottom surface;
  - b. a decorative layer coupled to the top surface of the core, the decorative layer having a desired aesthetic appearance; and
  - c. a wear layer coupled to and substantially covering the decorative layer for protecting the decorative layer,  
the wear layer having an exposed wear surface with depressions therein, at least one depression reaching a depth of at least 1.0 millimeters below the wear surface, the depressions being arranged to display a desired texture pattern.
4. The decorated floor panel of Claim 1, wherein the panel includes a first pair of parallel sides, wherein the parallel sides have tongue and groove cuts along the parallel sides to provide interlocking engagement.
5. The decorated floor panel of Claim 4, wherein the panel includes a second pair of parallel sides, the second pair of parallel sides being perpendicular to each of the first pair of parallel sides and wherein the second pair of parallel sides have tongue and groove cuts to provide interlocking engagement.
6. The decorated floor panel of Claim 1, wherein the core comprises fiber board.
7. The decorated floor panel of Claim 1, wherein the decorative layer comprises paper and substantially covers the top surface of the core.
8. The decorated floor panel of Claim 1, wherein the wear layer comprises melamine reinforced with aluminum oxide.

9. The decorated floor panel of Claim 1, further comprising a backing layer coupled to and substantially covering the bottom surface of the core as a reinforcing element.
10. The decorated floor panel of Claim 9, wherein the backing layer comprises melamine reinforced with aluminum oxide.
11. The decorated floor panel of Claim 1, wherein the aesthetic appearance of the decorative layer is a hardwood flooring design.
12. The decorated floor panel of Claim 1, wherein the aesthetic appearance of the decorative layer is a ceramic flooring tile design.
13. The decorated floor panel of Claim 1, wherein at least one depression in the wear surface reaches a depth of at least 0.50 millimeters.
14. The decorated floor panel of Claim 1, wherein at least one depression in the wear surface reaches a depth of at least 1.0 millimeters.
15. The decorated floor panel of Claim 1, wherein at least one depression in the wear surface reaches a depth of at least 1.50 millimeters.
16. The decorated floor panel of Claim 1, wherein at least one depression in the wear surface reaches a depth of at least 2.0 millimeters.
17. The decorated floor panel of Claim 1, wherein at least one depression in the wear

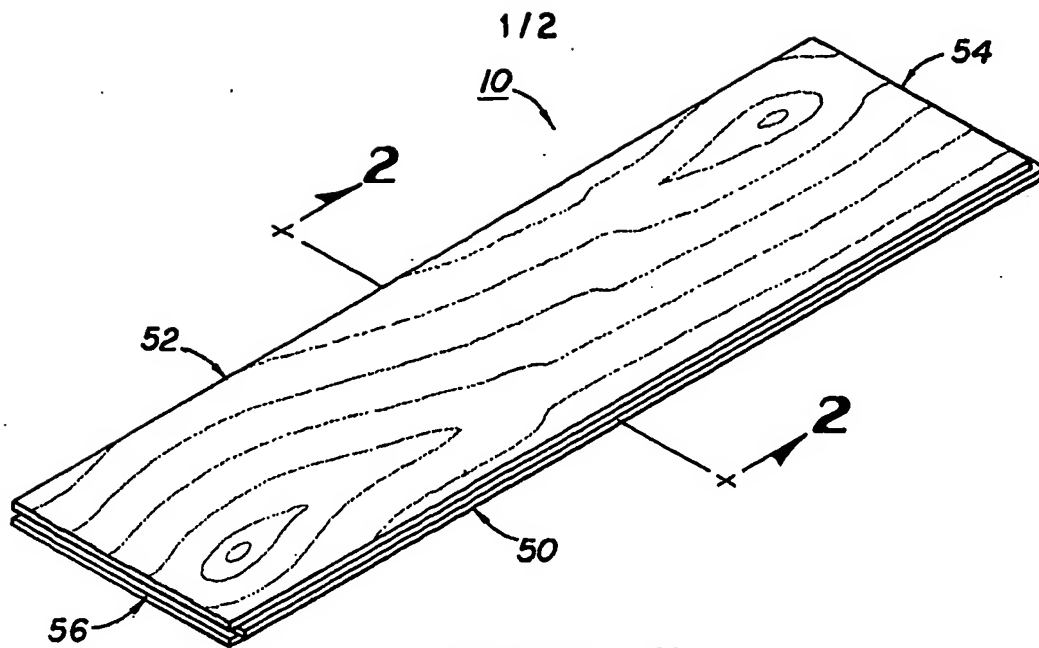
surface reaches a depth of at least 2.50 millimeters.

18. The decorated floor panel of Claim 1, wherein at least one depression in the wear surface reaches a depth of at least 3.0 millimeters.
19. The decorated floor panel of Claim 11, wherein the hard wood flooring design includes the visual appearance of at least one knothole, and wherein the wear surface has at least one depression therein in registration with the knothole.
20. The decorated floor panel of Claim 19, wherein the knothole is substantially circular and wherein the corresponding depression in registration with the knothole is also substantially circular in top plan view.
21. The decorated floor panel of Claim 12, wherein the ceramic flooring tile design includes the visual appearance of at least one groutline, and wherein the wear surface has at least one depression therein in registration with the groutline.
22. The decorated floor panel of Claim 21, wherein the groutline is substantially square and wherein the corresponding depression in registration with the groutline is also substantially square in top plan view.
23. The decorated floor panel of Claim 21, wherein the corresponding depression in registration with the groutline has a non-smooth and rough texture.

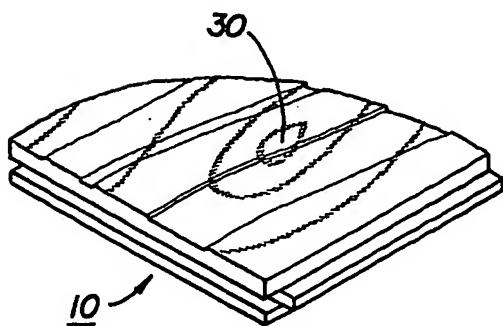
24. A decorated floor panel comprising:
- a. a core having a top surface and an opposite bottom surface;
  - b. a decorative layer coupled to the top surface of the core, the decorative layer having an appearance of a hardwood flooring design including at least one knothole; and
  - c. a wear layer coupled to and substantially covering the decorative layer for protecting the decorative layer,
- the wear layer having an exposed wear surface with depressions therein of a variable depth below the wear surface, the depressions being arranged to display a desired texture pattern including at least one depression in registration with the knothole.
25. A decorated floor panel comprising:
- a. a core having a top surface and an opposite bottom surface;
  - b. a decorative layer coupled to the top surface of the core, the decorative layer having a desired aesthetic appearance forming a decorative pattern; and
  - c. a wear layer coupled to and substantially covering the decorative layer for protecting the decorative layer,
- the wear layer having an exposed wear surface having a desired texture pattern thereon, the texture pattern comprising a plurality of depressions imparted to the wear layer, the relative orientation of the texture pattern and the decorative pattern being controlled such that the decorative pattern and the texture pattern are substantially in registration.
26. The decorated floor panel of Claim 25 wherein the aesthetic appearance of the decorative layer is a hardwood flooring design.

27. The decorated floor panel of Claim 25 wherein the aesthetic appearance of the decorative layer is a ceramic flooring tile design.
28. A floor system including at least two interlocking panels, each panel comprising:
- a. a core having a top surface, an opposite bottom surface, a first pair of parallel sides having tongue and groove cuts and a second pair of parallel sides having tongue and groove cuts, each of the second pair of parallel sides being perpendicular to each of the first pair of parallel sides;
  - b. a decorative layer coupled to the top surface of the core, the decorative layer having a desired aesthetic appearance; and
  - c. a wear layer coupled to and substantially covering the decorative layer for protecting the decorative layer,
- the wear layer having an exposed wear surface with depressions therein of a variable depth below the wear surface, the depressions being arranged to display a desired texture pattern.

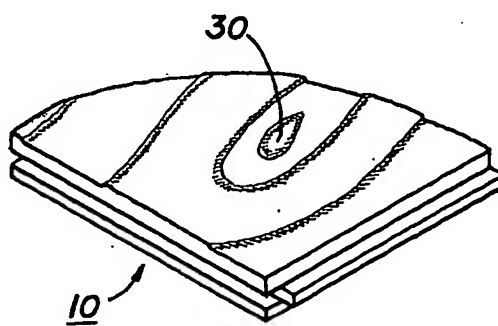
29. A decorated floor panel comprising:
- a. a core having a top surface and an opposite bottom surface;
  - b. a decorative layer coupled to the top surface of the core, the decorative layer having a desired aesthetic appearance; and
  - c. a wear layer having a thickness and being coupled to and substantially covering the decorative layer for protecting the decorative layer,
- the wear layer having an exposed wear surface with at least one depression that extends at least 0.50 millimeters below the wear surface and to a depth up to 0.25 millimeters less than the thickness of the wear layer.
30. The decorated floor panel of Claim 29, wherein at least one depression in the wear surface extends at least 0.50 millimeters below the wear surface and to a depth up to 0.50 millimeters less than the thickness of the wear layer.



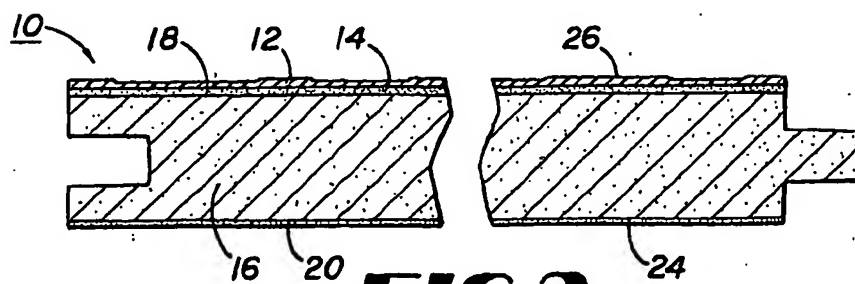
**FIG 1**



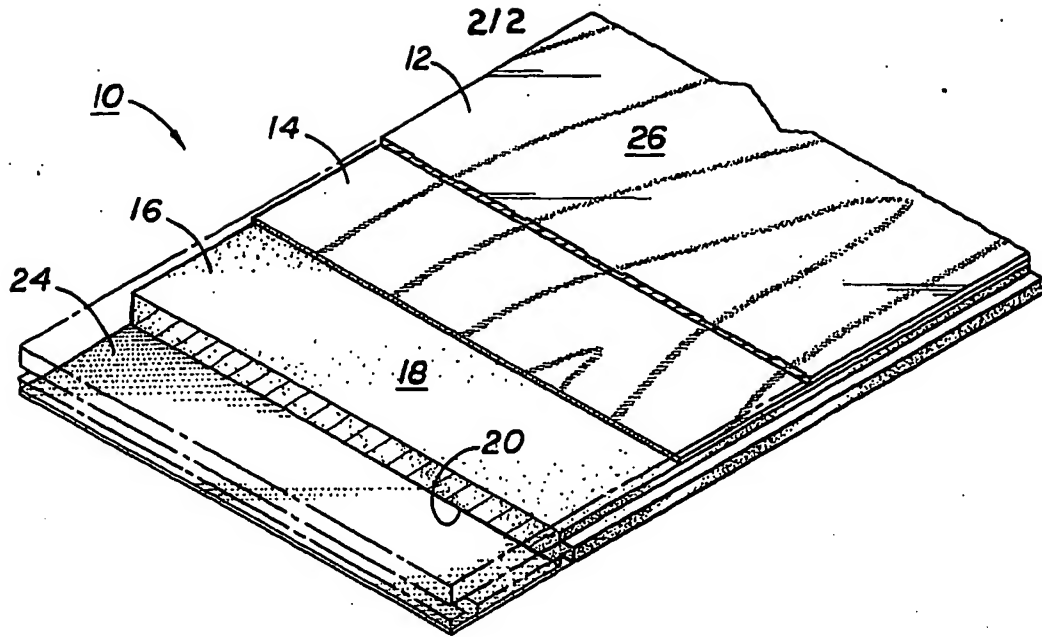
**FIG 1A**



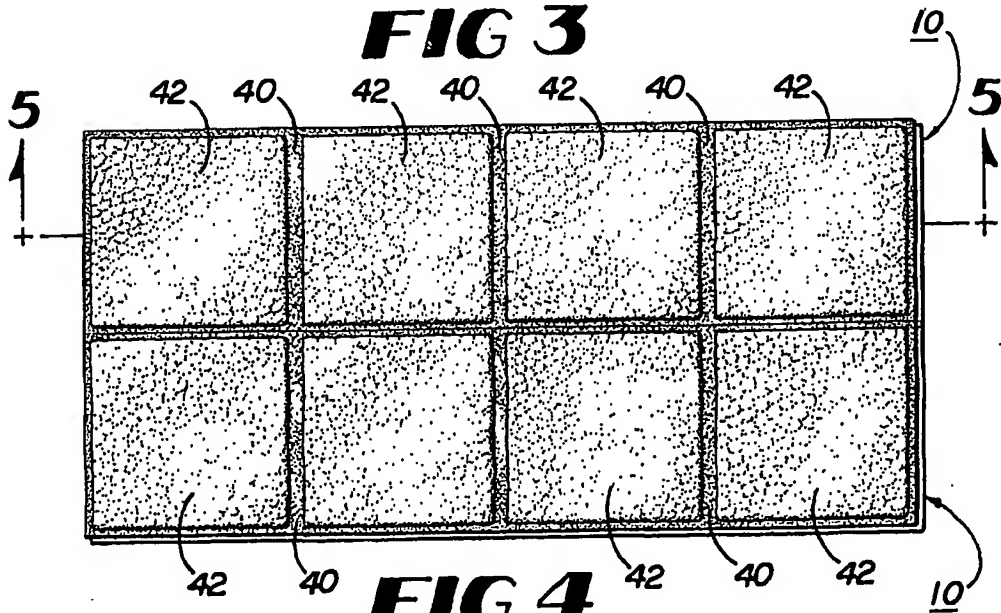
**FIG 1B**



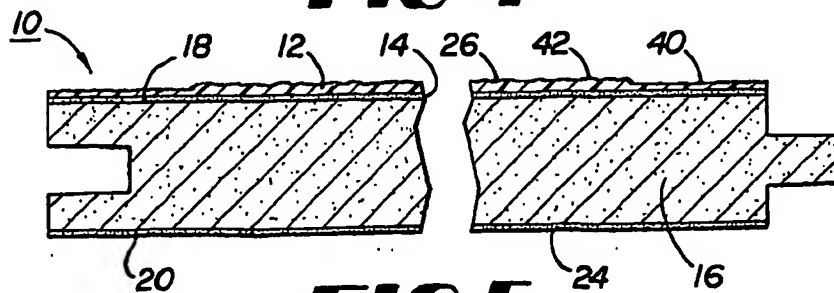
**FIG 2**



**FIG 3**



**FIG 4**



**FIG 5**

## INTERNATIONAL SEARCH REPORT

 International application No.  
 PCT/US01/02770
**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(7) :B32B 3/26

US CL :428/156. 203; 52/177, 311.1, 313, 314

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 428/156. 203; 52/177, 311.1, 313, 314

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EAST/BRIS/USPAT search terms: wear nears layer same embossed and fiberboard

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4,374,886 A (RAGHAVA) 22 FEBRUARY 1983, abstract, col. 2, lines 40-65, col. 9, lines 5-20.	1-3, 6-27, 29-30
Y		4-5 and 28
Y	US 6,006,486 A (MORIAU et al.) 28 DECEMBER 1999, abstract, col. 8, line 60 through col. 9, line 15.	4-5 and 28

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

\* Special categories of cited documents:

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

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later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"Z"

document member of the same patent family

Date of the actual completion of the international search

02 MAY 2001

Date of mailing of the international search report

21 MAY 2001

 Name and mailing address of the ISA/US  
 Commissioner of Patents and Trademarks  
 Box PCT  
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